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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,980	03/11/2004	Jin-Woo Park	1514.1036	4618

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EXAMINER

HO, TU TU V

ART UNIT PAPER NUMBER

2818

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

11A

Office Action Summary

Application No.

10/796,980

Applicant(s)

PARK ET AL.

Examiner

Tu-Tu Ho

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-17 and 23-37 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-10, 14 and 18 is/are rejected.
- 7) ☒ Claim(s) 5, 11-13 and 19-22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Oath/Declaration

1. The oath/declaration filed on 03/11/2004 is acceptable.

Claim Objections

2. **Claim 14** is objected to because of the following informalities: Claim 14 recites: "to form a passivation later" which appears to contain a typographical error because it is not what is disclosed in the detailed descriptions. For examination purpose, the phrase is interpreted to be "to form a passivation layer". Appropriate correction is required.

Claim Rejections § 102 & § 103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill

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in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 7-9, and 18 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Pichler et al. U.S. Patent 6,402,579 (the '579 patent).

The '579 patent discloses in the figures, particularly Fig. 5, and respective portion of the specification an organic light emitting device (OLED) as claimed or substantially as claimed.

Referring to **claim 1**, the reference discloses an organic light emitting device comprising;

- a substrate (10) ;
- a lower electrode (20) on the substrate;
- at least one organic thin film layer (30/40) disposed on the lower electrode; and
- an upper electrode (50/60) disposed on the at least one organic thin film layer comprising a conductive material, the upper electrode including at least a first thin film (50) having a first grain density of the conductive material and a second thin film (60) having (an inherent) second grain density of the conductive material (that appears to be) other than the first grain size.

In other words, the reference fails to explicitly disclose that the second grain density is other than the first grain density.

Nevertheless, the reference discloses that the first grain density of the first thin film is with low average grain size and good adhesion to the organic layer to minimizes de-lamination and moisture (paragraph bridging columns 2 and 3), which is the main objective of the invention of the reference. In other words, while the reference is silent about the second grain density of the second thin film, the low average grain size of the first thin film either suggests, or motivates one of ordinary skill in the art to think and consequentially form the device such that, that the

second grain size of the second thin film is not of “the low average grain size”, or “other than the first grain size”, since the electrode comprising the first thin film layer and the second thin film layer is formed as two layers in two, obviously, different steps, it appears that the two different steps for the two different layers would necessarily result in different grain sizes.

Referring to **claim 7** and using the same reference characters, citations, and interpretations as detailed above for claim 1, the reference discloses an organic light emitting device comprising;

- a substrate;

- a lower electrode disposed on the substrate;

- at least one organic thin film layer disposed on the lower electrode; and

- an upper electrode disposed on the at least one organic thin film, the upper electrode comprising at least a first thin film having a conductive material having a first grain size and a second thin film having the conductive material having a second grain size (that appears to be) other than the first grain size.

Referring to **claim 18** and using the same reference characters, citations, and interpretations as detailed above for claim 1, the reference discloses an organic light emitting device and an inherent method of fabricating thereof comprising:

- forming a lower electrode on an insulating substrate;

- forming an organic thin film layer on the lower electrode; and

- successively forming first and second thin films on the organic thin film to form an upper electrode, the first thin film having a first grain density of a conductive material (that appears to be) other than a second grain density of the conductive material of the second thin film.

Referring to **claims 2 and 8**, as noted above, the reference discloses that first grain density of a conductive material appears to be other than a second grain density of the conductive material of the second thin film, thus satisfying the limitation of the claimed Markush group of “wherein one of the first and second thin films having a highest one of the first and second grain densities is formed farthest away from the substrate”. Also as noted above, the reference further discloses that the low average grain size of the first thin film helps minimize de-lamination and moisture invasion, thereby disclosing that the one thin film having the highest grain density – as low grain size leads to high grain density - acts as a passivation layer that prevents moisture and/or oxygen from infiltrating past the one thin film to the at least one organic thin film layer as claimed.

Referring to **claims 3 and 9**, as the grain densities of the first and second thin films vary in a non-linear fashion, the first and second thin films form a boundary surface therebetween due to a difference in the first and second grain densities.

4. Claims 1-4, 6-10, 14, and 18 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Suzuki et al. U.S. Patent Application Publication 20050003231 (the ‘231 reference).

The ‘231 reference discloses in Fig. 1 and respective portion of the specification an organic light emitting device (OLED) as claimed or substantially as claimed.

Referring to **claim 1**, the reference discloses an organic light emitting device comprising;
a substrate (1) ;
a lower electrode (2/3) on the substrate;

at least one organic thin film layer (4) disposed on the lower electrode; and
an upper electrode (5/6) disposed on the at least one organic thin film layer comprising a conductive material, the upper electrode including at least a first thin film (5, "electron injection electrode") having a first grain density of the conductive material and a second thin film (6, "protective electrode") having (an inherent) second grain density of the conductive material (that appears to be) other than the first grain size.

In other words, the reference fails to explicitly disclose that the second grain density is other than the first grain density.

Nevertheless, the reference discloses that the first grain density of the first thin film is within the range of 20 to 100 nm in order to obtain luminance evenness and sufficient crystal growth (paragraph [0078]), which is the main objective of the invention of the reference. In other words, while the reference is silent about the second grain density of the second thin film, the specified range of grain density of the first drain density of the first thin film either suggests, or motivates one of ordinary skill in the art to think and consequentially form the device such that, that the second grain size of the second thin film is not of, or not required to be, within the range of 20 to 100 nm, because the electrode comprising the first thin film layer and the second thin film layer is formed as two layers in two, obviously, different steps, it appears that the two different steps for the two different layers would necessarily result in different grain sizes.

Alternately, the grain size of the second thin film, which is further away from the substrate as compared to the first thin film, could be positively explicitly formed such that the grain size of the second thin film is larger than, thus would be different than or, other than, the first grain size of the first thin film in view of Sekiya et al. U.S. Patent Application Publication

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20020027414. Sekiya, in disclosing an OLED display device, teaches that to reduce voltage drop across the device, it is necessary to reduce the resistance of the top electrode (paragraph [0018]), which entails increasing the grain size, as is known in the art or as disclosed by Hanakawa et al. U.S. Patent Application Publication 20020008815, paragraph [0015].

Therefore, it would have been obvious to one of ordinary skill in the art the time the invention was made to form the '231 reference's second thin film such that it has large grain size, to reduce resistance, to reduce voltage drop across the device, as compared with the other electrodes, as taught by Sekiya.

Referring to **claim 7** and using the same reference characters, citations, and interpretations as detailed above for claim 1, the reference discloses an organic light emitting device comprising;

- a substrate;

- a lower electrode disposed on the substrate;

- at least one organic thin film layer disposed on the lower electrode; and

- an upper electrode disposed on the at least one organic thin film, the upper electrode comprising at least a first thin film having a conductive material having a first grain size and a second thin film having the conductive material having a second grain size (that appears to be) other than the first grain size.

Referring to **claim 18** and using the same reference characters, citations, and interpretations as detailed above for claim 1, the reference discloses an organic light emitting device and an inherent method of fabricating thereof comprising:

- forming a lower electrode on an insulating substrate;

forming an organic thin film layer on the lower electrode; and
successively forming first and second thin films on the organic thin film to form an upper electrode, the first thin film having a first grain density of a conductive material (that appears to be) other than a second grain density of the conductive material of the second thin film.

Referring to **claims 2 and 8**, as noted above, the reference discloses that first grain density of a conductive material appears to be other than a second grain density of the conductive material of the second thin film, thus satisfying the limitation of the claimed Markush group of “wherein one of the first and second thin films having a highest one of the first and second grain densities is formed farthest away from the substrate”. The reference further discloses that the dense film characteristic of the first thin film helps minimize moisture invasion, thereby disclosing that the one thin film having the highest grain density – as low grain size leads to high grain density - acts as a passivation layer that prevents moisture and/or oxygen from infiltrating past the one thin film to the at least one organic thin film layer as claimed.

Referring to **claims 3 and 9**, as the grain densities of the first and second thin films vary in a non-linear fashion, the first and second thin films form a boundary surface therebetween due to a difference in the first and second grain densities.

Referring to **claims 4, 6, 10, and 14**, the ‘231 reference further discloses that the first thin film electrode may comprise aluminum (Al, paragraph [0083]), that the second thin film electrode may comprise aluminum (Al, paragraph [0090]), thereby disclosing that the first and second thin films of the upper electrode have the same conductive material and that the first and second thin films comprise aluminum thin films as claimed.

Allowable Subject Matter

5. Claims 15-17, 23, and 24-37 are allowable over the prior art of record.

Claims 5, 11 and dependent claims 12-13, 19 and dependent claim 20, 21, and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for the indication of allowable subject matter: The cited art, whether taken singularly or in combination, especially when all limitations are considered within the claimed specific combination, fails to teach or render obvious an organic light emitting device and a method of fabricating and organic light emitting device having all exclusive limitations as recited in claims 1/5 (claims 1 and 5), 7/11, 15, 18/19, 1/2/21, 7/22, and 24, characterized in the exclusive limitations as recited in claims 5, 11, 15, 19, 21, 22, and 24, respectively.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tu-Tu Ho
April 29, 2005